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Saving, Investment, and Growth in Developing Countries

An Overview

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The most effective way to promote investment, innovation, and growth is to provide a supportive policy environment and institutions. The essentials are macroeconomic stability, undistorted prices, well-defined and well-enforced property rights, an environment that keeps business costs low, and political institutions that foster social consensus and political stability. Government should also provide adequate infrastructure and human capital investment — whether as public projects or with the help of the private sector.

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Summary findings

The 1990s have seen renewed interest in themes of economic growth and development. This is a welcome change after a decade and a half during which macroeconomics was dominated by a concern with short-term adjustment and stabilization issues — and basic problems of growth, capital accumulation, and the generation of savings were largely ignored.

Schmidt-Hebbel, Serven, and Solimano draw three general lessons from recent literature on saving, investment, and growth:

- Despite empirical evidence about virtuous circles of heavy saving and investment and rapid growth, the relationship between the three is complex, with causality running in several directions.
- Still, saving often seems to follow, rather than precede, investment and growth, contrary to the Mill-Marshall-Solow interpretation.
- Investment and innovation are the centerpieces of growth. In this regard, the new literature on growth represents a decided (if unintended) return to the tradition initiated by Marx, Schumpeter, and Keynes.

Saving may not be the chief driving force behind growth, but ensuring an adequate savings level must remain a central policy concern — to ensure enough financing for capital accumulation and to prevent inflationary pressures or balance of payments disequilibria or both. And encouraging private saving may be essential to expand investment, considering capital market imperfections and liquidity constraints on firms and households in many developing economies. Four policy conclusions emerge:

- Public saving does not crowd out private saving one-to-one, so increasing public saving is an effective direct way to raise *national* saving.
- Foreign saving should be allowed and encouraged to support domestic investment — even if it also helps finance consumption — as long as the macroeconomic and regulatory framework is adequate.
- Higher private saving should not be expected in response to the liberalization of interest rates. Market-determined interest rates will improve financial intermediation, the quality of portfolio choices, and the quality of investment — but not necessarily the volume of savings. Pension reform may be a better way to mobilize domestic resources.
- Potentially large externalities associated with investment would seem to suggest the need for an "activist" investment policy. But a better way to promote investment and growth is a supportive policy and institutional environment, ensuring macroeconomic stability, social consensus, and a low cost of doing business.

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SAVING, INVESTMENT AND GROWTH IN DEVELOPING COUNTRIES: AN OVERVIEW

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1. INTRODUCTION

The 1990s have seen a resurgence of interest in themes of economic growth and development. This is certainly a welcome change from the last decade and a half, during which macroeconomics was dominated by a concern with short-term adjustment and stabilization issues, leaving largely aside the basic problems of growth, capital accumulation and saving generation.

Material progress and improving living standards require sustained output expansion. Even though questions of capital formation, technical progress and supportive saving have been at the core of economic analysis for two or three centuries, their links are far from being clearly understood still today. Causes and effects among them are not unambiguous and several factors can start and support growth. The transformation of an initial growth spurt into a sustained process of output expansion and prosperity requires accumulation of capital and its corresponding financing. This sets in motion a self-reinforcing process in which perceived prosperity invites investment, actual investment supports growth, and saving flows are generated along the way as income rises.

These links, however, can be weak. As the Latin American experience of the 1980s has shown the resumption of investment and growth after a period of adjustment and depressed economic activity is far from automatic. Coordination failures, pervasive uncertainties and irreversibilities in investment, all make the recovery of growth a complex process. Moreover, the ability of governments to boost saving is often limited, and scarce foreign financing can pose a binding constraint. Booms are not problem-free either, as they often generate unsustainable growth trajectories that lead to busts. These transitional problems are analytically exciting but constitute a nightmare for policy-makers. The bliss of steady growth still remains elusive. Historically, sustained growth paths have lasted at best a few decades, as in East Asia since the 1960s. By contrast, the high growth enjoyed by Brazil and Mexico between 1940 and 1980 has been followed by persistently sluggish growth thereafter.

This paper provides a policy-oriented overview of recent theoretical and empirical work on saving and physical investment and their relationship with growth. Because the research and policy agenda in

these areas is quite broad, the paper focuses only on major issues and broad shifts in perspective highlighted in the recent literature, leaving aside a number of potentially interesting topics. Nevertheless, the discussion covers a variety of issues, such as the interaction between saving and investment, their links with growth, the sensitivity of saving to policy measures, or the implications of uncertainty and instability for capital accumulation and growth. Needless to say, some of these questions -- such as the complexities of the link between income distribution and capital accumulation, or the practical importance of the externalities associated with physical investment -- are still far from being fully understood.

The paper is organized in seven sections. First, it reviews recent world and regional trends in saving, investment and growth (section 2). The paper then re-examines the critical saving-investment-growth links in the light of the recent theoretical and empirical literature (section 3). Next, the discussion turns to the behavior of saving, focusing on the links to fiscal policy, foreign saving, and financial and tax incentives (section 4). The paper then examines the main features of investment behavior highlighting new developments on the impact of irreversibility and uncertainty, political instability and institutional factors, and the links between income distribution, profitability and investment (section 5). Next, the discussion turns to the saving and investment response to the different phases of adjustment and reform programs (section 6). Finally, the paper's concluding section turns to the issue of appropriate policy interventions to foster accumulation and growth (section 7).

2. FACTS AND PUZZLES: LONG-TERM REGIONAL TRENDS

Saving, investment, and growth have shown in most world regions a 30-year downward trend that is both puzzling and worrisome (see Table 1).[1] World saving and investment rates have declined by

[1] The data source for Table 1 is the World Bank's BESD data base, which in turn is based on national accounts data published by country sources or by the IMF's International Financial Statistics. Regional means for each period are unweighted averages of country means for the corresponding period. Regional standard deviations for 1965-92 are unweighted averages of country standard deviations for 1965-92 (or the available period, if shorter). Note that the regional averages of standard deviations reflect the average instability over time that countries face

some 3 percentage points of GDP during 1982-92 in comparison to 1974-81. Annual per-capita world GDP growth shows a marked long-run decline from 2.7% in 1965-73 to 2.0% in 1974-81 and to a bare 0.5% in 1982-92.[2]

These negative trends are more marked in LDCs than in OECD countries. And among developing regions, large disparities in performance are observed, with Africa and East Asian providing the two extreme cases of regional divergence. While in Africa gross national saving rates were more than halved between 1965-73 and 1982-92 -- falling to a record low 3% of GNP in 1990-92 -- the East-Asian tigers' national saving rates rose from 20% of GNP to 32% during the same period -- actually reaching 35% in 1990-92. With massive increases in foreign saving inflows (from 6.7% of GNP in 1965-73 to 15% in 1982-92), Africa's investment performance did not suffer much despite the reduction in national saving; while lower than in the 1970s, Africa's recent investment rates exceed those achieved in 1965-73. The opposite trend in the contribution of foreign saving to financing domestic investment is observed in the group of East Asian tigers, where foreign saving has declined to a tiny 1.5% in 1982-92. This, however, does not make East Asia's investment performance any less impressive than its saving record: at 33% of GDP in 1982-92 (and 36% in 1990-92), East Asia's investment rate exceeds by 12 percentage points of GDP the rates prevalent in both OECD countries and other LDCs. It is not coincidental that East-Asia's 1982-92 per capita GDP growth, at 4.8% per year, is ten times as high as the world's average

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in any given region -- and not the regional dispersion of country performance indicators. Sample sizes vary slightly by variables and years within the 1965-1990 span, with the world sample varying between 99 and 104 countries, and declining more strongly for 1991 and 1992 (when the world sample includes only between 87 and 102 countries). The main regions considered here are Sub-Saharan Africa (Africa), Latin America and the Caribbean (LAC), six East-Asian Countries (the "tigers" comprised by Hong Kong, Indonesia, Korea, Malaysia, Singapore, and Thailand), Other Developing Countries (Middle-Eastern and other Asian countries), All LDCs, and OECD countries. Former socialist countries are excluded from the sample.

[2] One should be aware of the limitations of regional means and standard deviations: variable definitions and data quality vary across countries, some countries are excluded from each region, and the use of unweighted averages -- while useful when treating each country experience as one distinct observation -- is not representative of individual country (and regional) economic weights and is inconsistent with world adding-up constraints (for instance, that the world's foreign saving should be zero).

of 0.5%. At the other extreme, Africa experienced an average annual 0.4% decline in per capita GDP during 1982-92.

Latin America and the Caribbean's (LAC) investment and growth performance is disturbingly similar to Africa's -- both in magnitude and time pattern. In contrast with Africa, however, LAC's investment is financed to a larger extent by national saving, which results in lower current account deficits.

Another important aspect of countries' performance is the stability of their saving, investment and growth patterns. The last column in Table 1 reports regional averages of country standard deviations for 1965-92, that reflect the instability that countries have faced in their performance indicators during the last three decades.

Instability is much more acute in LDCs than in OECD countries -- standard deviations of the five indicators are typically twice as large in the former than in the latter. While these measures of instability should be viewed with some caution,[3] their regional pattern does suggest that bad performance goes together with high instability. Africa is again the extreme case, with the largest standard deviations.

Higher instability in the poorer and worst-performing regions may well reflect their larger exposure to adverse foreign shocks, the higher incidence of various domestic shocks (ranging from wars to droughts), and their lower capability to cope with these shocks. This inference is supported by annual figures for regional performance (not presented here), that reveal the importance of worldwide shocks for decade-long performance trends. Saving, investment and growth suffered in all regions in the aftermath of the first (1973) and second (1980) oil shocks. But East Asia's performance suffered less and recovered more quickly from the adverse oil shocks than most other oil-importing developing countries.

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[3] Note that the standard deviation is larger when time trends or step-wise structural breaks are present -- as actually is the case in many variables. Hence successful development -- as reflected by uptrending saving, investment and growth like in East Asia -- could raise our measure of instability. Nevertheless, we prefer to report straightforward standard deviations instead of standard deviations from time trends, as the latter would be based on necessarily arbitrary trend estimates.

Table 1
World Saving, Investment, and Growth Rates by Major Regions and Sub-periods, 1965-1992
(Means and Standard Deviation)

	1965-73 Mean	1974-81 Mean	1982-92 Mean	1965-1992 Mean	1965-92 St. Deviation
GROSS NATIONAL SAVING (% of GNP, including transfers)					
AFRICA	10.7	8.3	4.8	7.7	8.7
LAC	16.8	18.6	13.0	15.8	6.0
EAST-ASIAN TIGERS	19.6	27.5	32.4	26.9	6.6
OTHER LDCS	15.8	20.5	16.5	17.4	5.2
ALL LDCS	14.1	15.0	11.4	13.3	7.1
OECD	25.7	23.5	21.2	23.3	3.1
WORLD	16.6	16.8	13.3	15.4	6.3
GROSS DOMESTIC INVESTMENT (% of GDP)					
AFRICA	16.9	21.8	19.2	19.2	6.2
LAC	20.3	23.5	19.3	20.8	4.8
EAST-ASIAN TIGERS	22.8	30.4	32.6	28.8	6.2
OTHER LDCS	18.7	23.4	21.9	21.3	4.6
ALL LDCS	18.7	23.2	20.7	20.8	5.5
OECD	25.6	24.7	21.6	23.8	3.2
WORLD	20.2	23.5	20.9	21.4	5.0
CURRENT ACCOUNT BALANCE (% of GNP, including transfers)					
AFRICA	6.7	14.4	15.2	12.3	9.3
LAC	4.2	5.6	7.9	6.1	5.3
EAST-ASIAN TIGERS	3.9	3.5	1.5	2.8	5.5
OTHER LDCS	2.7	3.1	5.8	4.0	5.8
ALL LDCS	5.0	8.9	10.3	8.2	7.3
OECD	-0.1	1.2	1.1	0.8	3.3
WORLD	3.9	7.3	8.3	6.6	6.4
GDP GROWTH RATE (%)					
AFRICA	4.3	3.5	2.4	3.3	5.8
LAC	5.5	3.1	1.9	3.4	4.5
EAST-ASIAN TIGERS	8.0	6.6	6.2	6.9	3.3
OTHER LDCS	5.0	2.9	3.3	3.7	4.7
ALL LDCS	5.0	3.5	2.7	3.7	5.0
OECD	5.3	4.5	3.1	4.2	2.8
WORLD	5.1	3.7	2.8	3.8	4.6
PER CAPITA GDP GROWTH					
AFRICA	1.2	1.1	-0.4	0.6	5.6
LAC	2.6	1.5	-0.7	1.1	4.6
EAST-ASIAN TIGERS	5.2	5.0	4.8	4.8	3.1
OTHER LDCS	3.7	3.3	1.1	2.7	4.8
ALL LDCS	2.4	2.0	0.2	1.5	5.0
OECD	4.0	2.2	1.7	2.8	2.9
WORLD	2.7	2.0	0.5	1.8	4.6

Source: The World Bank (see footnote 1).

We draw four conclusions from these facts. First, all world regions -- including OECD countries but with the remarkable exception of East Asia -- show a disturbing downward trend in their saving, investment and growth performance during the last three decades. Second, the regional diversity within LDCs is growing: the poorest countries and regions (Africa) are getting even poorer while middle-income countries and regions (East Asia in particular) grow richer. Third, the poorer regions are not only affected by bad performance but also by much higher degrees of instability. This suggests that better policies and a mature institutional framework -- encountered more often in East Asia than in Africa and Latin America -- are paramount to overcome spells of bad luck more rapidly and effectively. And, finally, the facts strongly suggest the existence of vicious circles of low saving and investment and deteriorating growth (e.g., Africa), along with virtuous circles of vigorous saving and investment and rapid growth (e.g., East Asia). The nature of these links is the subject of the next section.

3. SAVING, INVESTMENT AND GROWTH

The traditional wisdom of development theory since at least World War II has been that the long-run rate of economic growth is largely dependent on the saving rate: saving determines the financeable rate of capital accumulation, which in turn is the basic determinant of long-run growth.[4] Recent theoretical and empirical research has shed new light on, and also uncovered some puzzles, concerning this mechanism. Below we draw from this work to examine three key questions that refer to each of the logical building blocks of the conventional wisdom: first, what is the relationship (and, specifically, the direction of causality) between growth and saving ? Second, does countries' national saving really get

[4] This notion rests on what is termed the "Marshall-Mill view" (adopted later by Solow as well; see Chakravarty 1993, chapter 3). For an alternative interpretation of post-World War II growth, see Marglin and Schor (1990).

translated into domestic investment -- or, more generally, what is the saving-investment link ? And third, what is the contribution of capital accumulation to growth -- most importantly, is investment really the key to growth ?

3.1 - Saving-growth causality: which way?

The conventional wisdom would seem to be supported by the long-term patterns of saving and growth in developing countries described in the preceding section, which as noted earlier hint at the existence of a virtuous cycle between development and saving -- as well as low-saving and poverty traps -- across countries and over time. Indeed, during the 1960s Asia and Sub-Saharan Africa had similar average gross domestic saving rates (12% of GDP); twenty years later Asian saving rates almost doubled to reach 22% of GDP and African rates were halved to 6% of GDP. At the country level, Korean household saving rates started at levels close to zero in the mid-1960s and, after 20 years of high growth, rose above 20% of household income.

The apparent policy implication would be that raising domestic saving levels is of high priority to ensure a sustainable path of high growth. Yet recent research has shown that the relationship between private saving and income growth is a complex one. It is important to distinguish two aspects of the saving-income link: first, the saving response to income fluctuations; second, its response to trend income or growth.

The saving-growth link over the cycle

Consider first income fluctuations. Overwhelming evidence for industrial and less systematic results for developing countries show that both public and private saving are strongly pro-cyclical: most fiscal policies are counter-cyclical and private consumers tend to smooth consumption spending over the business cycle. If households are forward-looking, not credit constrained and temporary income

fluctuations do not change permanent income much, consumption would respond only marginally to temporary fluctuations. But households, particularly poorer ones in developing countries or those below a certain threshold income, tend to be credit-constrained and therefore respond strongly even to temporary income shocks (Deaton 1989a,b). Campbell and Deaton (1989) also argue that a household's perception of its permanent income is strongly affected by current shocks, with no evident distinction made between current and permanent income flows. Both preceding arguments imply that households will consume out of current shocks, saving much less than predicted by permanent-income and life-cycle theories, giving rise to what in the U.S. literature is termed "excess sensitivity of consumption" (Flavin 1981, Hall and Mishkin 1982). Few empirical studies of developing countries have looked closely at the effect of income fluctuations on saving. Exceptions are Gupta (1987) and Schmidt-Hebbel, Webb and Corsetti (1992), which find that saving responds significantly and positively to temporary income shocks but by much less than what is predicted by the permanent-income hypothesis.

The longer term

Let us turn now to the relation between trend income and private saving, which is the more relevant one from the viewpoint of long-term growth. It is a bit ironic that while the strong correlation between saving and growth is a firmly established empirical fact, researchers have found it hard to identify the precise links between saving and growth.

Most cross-country empirical studies that include income growth as a determinant of saving report a significant positive effect of growth rates on the saving rate. This result is obtained for example by Modigliani (1990) in a large study based on combined cross-country time-series data, performed separately for 21 OECD countries and 85 developing economies. Jappelli and Pagano (1994) for OECD countries, and Edwards (1994) for a sample of both OECD and LDC economies, confirm this finding. The same result arises in cross-country empirical work for developing economies – such as those by

Collins (1991), Fry (1978, 1980), Giovannini (1983, 1985), Mason (1987, 1988), Mason et al. (1989), and Schmidt-Hebbel, Webb and Corsetti (1992).[5]

From the viewpoint of textbook consumption theory, this poses a puzzle: both the conventional infinitely-lived, representative-agent model and the overlapping-generations model (where growth takes place mostly within cohorts' lifetimes) would predict a negative effect of growth on saving, as individuals adjust their present consumption upward in anticipation of higher future income. The exception could be a life-cycle overlapping-generations framework where growth takes place between cohorts (rather than within each cohort's lifetime); in such conditions, growth increases aggregate saving for the simple reason that income of the active cohorts (and hence their saving) is larger than income (and dissaving) of the retired cohorts. However, Carroll and Summers (1991) show for three OECD countries, and Deaton (1989b) for LDCs, that actual age-consumption profiles are not consistent with what is predicted by life-cycle theories, undermining the empirical importance of this mechanism.

A number of less-conventional hypotheses on consumer behavior have been advanced to explain the positive saving-growth link -- but have scarcely been tested (see Carroll and Weil 1993, for an overview). One is concentration of growth in households with high saving rates, such as rich or middle-aged households (Collins 1991) -- but its empirical relevance appears limited. A related, possibly more relevant explanation is that growth pushes consumers beyond the threshold level of income under which they are borrowing-constrained or myopic. Slowly-changing consumption habits could also contribute to higher saving rates in the face of rapid growth. Combinations of these approaches may also help explain the empirical evidence; Carroll and Weil (1993) suggest a mixture of habit formation with uncertain incomes (giving rise to precautionary saving) as a promising avenue for further research. A

[5] Interestingly, Carroll and Weil (1993) show that this may be partly due to the outlying observations from fast-growing, high-saving East-Asian countries: when these are omitted from their sample, the positive saving-growth correlation becomes much smaller and insignificant. However, Carroll and Weil's cross-country sample might also be biased by the exclusion of many low-income countries.

final unconventional hypothesis is that both consumption and wealth (or capital) enter the utility function -- an idea advanced in different ways by "classical" economists (from Smith and Marx to Keynes and Schumpeter, see Zou 1993b) and which is resurfacing in some very recent literature (Cole, Mailath and Postlewaite 1992, Fershtman and Weiss 1993, Zou 1993a, 1993b): higher growth raises wealth, but -- due to wealth/consumption substitutability -- increases consumption less than proportionately, thereby raising saving.

Of course, an alternative explanation would just go back to the Marshall-Mill tradition: saving is automatically translated into capital accumulation and thereby income growth, and this is simply the mechanism underlying the positive correlation between saving and growth observed in practice. Yet some empirical evidence that this may not be the whole story is provided by Carroll and Weil (1993), who argue that saving typically *follows* growth, rather than preceding it.

From the growth viewpoint, the main conclusion is that causality between saving and growth runs both ways. Thus, models that fail to take such two-way endogeneity into account likely overstate the contribution of saving to growth -- and this even under the maintained hypothesis that saving is fully translated into investment. We now turn to this issue.

3.2 - The saving-investment relationship

Understanding the saving-investment link is important for at least two reasons: first, as just argued, it may hold the key to the positive correlation between saving and growth. Second, if capital accumulation is indeed the centerpiece of the growth engine, the interaction between saving and investment is crucial for assessing the validity of the traditional recipe that raising saving is the surest way to increase growth -- which involves the implicit assumption that each country's extra saving is necessarily translated into higher domestic investment.

Textbook macroeconomics emphasizes that the determinants of saving are different from those of investment. The former depends mainly on income and wealth, whereas the latter depends on profitability and risk.[6] Being the result of two independent decisions, saving and investment can obviously differ ex-ante, as emphasized by the Keynesian tradition, in which discrepancies between planned saving and investment are at the heart of macroeconomic fluctuations and growth crises. Indeed, Keynes' well-known "paradox of thrift" – according to which an ex-ante increase in saving may lead via multiplier to an ex-post decline in real output, investment and saving itself – illustrates that policies aimed at raising investment and growth by encouraging saving might actually yield the opposite result.

Nevertheless, in the closed economy national saving and domestic investment must be identically equal at least in an ex-post sense, so that if saving effectively increases investment must rise as well. But matters are more complicated in the open economy, as capital flows introduce a distinction between national saving and domestic investment. National saving need not be used to invest domestically; it can also be devoted to finance investment abroad. Ideally, in a world of unrestricted capital mobility, each country's saving would flow to the most productive use in the world; thus, an increase in national saving would be primarily reflected in an improvement in the current account balance, rather than in higher domestic investment and growth. And this mechanism seems all the more relevant in view of the substantial decline in barriers to international capital flows (especially among industrial countries) over the last two decades.

This reasoning, however, is in direct contradiction with the empirical evidence first reported by Feldstein and Horioka (1980), and recently updated by Feldstein and Bacchetta (1991), that in the long-run saving and investment rates show a strong positive correlation. On a sample of industrial countries, Feldstein and Horioka find a correlation coefficient close to 0.9 (virtually the same found in Feldstein

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[6] This, of course, was one of the fundamental contributions of Keynes (1936). In the classical, pre-Keynes tradition, there was no independent investment function, and therefore investment just followed saving passively.

and Bacchetta's update). Other studies (Dooley, Frankel and Mathieson 1987; Summers 1988) find a similarly strong correlation for LDCs, although somewhat lower in magnitude than for industrial countries.

Low capital mobility or omitted factors?

Whether this result is evidence of international capital immobility has been the subject of considerable debate. One view (defended by Feldstein and his associates) holds that international capital mobility is indeed far from perfect, and therefore national saving increases crowd-in domestic investment (albeit through unspecified mechanisms). The alternative view is that the observed saving-investment correlation says little about international capital mobility[7] and is mostly due to policy reactions and/or common factors that cause both saving and investment to move together in the longer term.

Along these lines, a wide variety of mechanisms have been proposed that could give rise to a strong saving-investment correlation even in the presence of high capital mobility (Obstfeld (1994) provides an extensive review; see also Dornbusch (1991a) and Blecker (1994)). For example, Frankel (1993) argues that, even under perfect capital mobility, shifts in saving alter the real interest rate, which in turn tends to move investment in the same direction as saving; however, this would imply that real interest rates differ across countries even in the long run -- or, in other words, with uncovered interest parity real exchange rates would have to display long-run trends. A second explanation underscores the

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[7] The validity of saving-investment correlations as a measure of international capital mobility has been extensively discussed by Frankel (1992, 1993), who examines three alternative measures: covered interest parity, uncovered interest parity, and real interest rate equalization. Frankel (1992) argues that the first of these is the most adequate, as it compensates for country risk; he reports a significant decline (nearly a complete disappearance) in covered interest differentials among industrial countries in the 1980s, which implies that capital mobility increased steadily over the same period. In turn, Montiel (1993) provides a comprehensive analysis of capital mobility in LDCs. More generally, the finding reported in the text that saving-investment correlations are typically lower for samples of LDCs than for industrial countries -- in spite of the extensive capital controls and external borrowing constraints in many developing economies during the 1970s and 1980s -- raises strong suspicions about their validity as measures of capital mobility.

role of slowly-changing demographic and technological factors affecting both saving and investment in the same direction (Obstfeld 1986, Tesar 1991). A third alternative attributes the saving-investment link to the operation of the economy's long-run budget constraint (Obstfeld, 1986): in the long-run, if the economy is close to a stationary foreign asset/GDP ratio, it is possible to show that saving and investment ratios cannot show much divergence.

An alternative view shifts the focus from international to *domestic* capital immobility, by underscoring the close link between corporate investment (which in industrial countries accounts for the bulk of private investment) and retained earnings empirically found in most OECD economies (and highlighted by Feldstein and Horioka themselves). Indeed, in industrial countries retained earnings typically represent the major source of corporate investment financing; the strong correlation between both variables (documented by Murphy (1984) for U.S. firms, and by Blecker (1994) for a sample of OECD countries) could be the key to the aggregate saving-investment correlation.[8] This type of mechanism seems particularly relevant for LDCs, in which capital market imperfections are widespread and borrowing constraints are the norm, not only for organized corporations but especially for households and firms in the informal sector, which in many developing economies account for the majority of private investment.

Finally, another leading explanation (first proposed by Summers 1988) is based on the existence of restrictions on countries' current account imbalances, due either to lending constraints imposed by world capital markets on deficit countries, or to systematic (and successful) current account targeting by policy-makers. In both cases, the result would be a strong ex-post correlation between saving and investment. In particular, under the extreme situation of a perfectly inelastic supply of foreign borrowing

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[8] However, as Obstfeld (1994) notes, this requires not only that firms finance their investment with corporate earnings, but also that households fail to pierce the "corporate veil", thus failing to offset a rise in firms' saving with a decline in household saving, and thereby allowing a rise in corporate investment to be matched with a rise in *aggregate* saving.

-- as faced by many LDCs during the 1980s -- national saving and domestic investment would be highly (indeed perfectly) correlated. Moreover, in such conditions the supply of foreign saving would play a causal role in affecting domestic saving and investment -- in stark contrast with the textbook-case of perfect capital mobility in which foreign saving is determined residually by the excess of domestic investment over national saving, and any extra gross capital inflows are completely offset by gross outflows. Along these lines, Argimon and Roldan (1994) find empirically that in EC countries enforcing capital controls (presumably to target the external balance), saving and investment display virtually unit correlation, and causality runs from the former to the latter.

To sum up the discussion, the saving-investment puzzle remains far from resolved. From the policy viewpoint, the key conclusion is perhaps that underlined by Dornbusch (1991a): unless the empirical saving-investment link is better understood, its existence does not justify any strong inferences about the investment and growth response to saving policies.

3.3 - The investment-growth link

Growth and development theory have long regarded the accumulation of physical capital as the engine of growth. Indeed, the notion that raising the investment rate is key to increasing long-run growth has been at the heart of growth thinking since the times of David Ricardo.

The strong association between investment ratios and long-term growth performance is a well-established empirical fact (see e.g. Kuznets, 1973). Indeed, most country experiences of sustained growth tend to stress the link between capital accumulation and GDP growth. The case of East Asia, the most successful regional experience in terms of rapid and sustained growth of the last three decades, provides a good example. As documented in the preceding section , the East-Asian economies have been able to maintain rates of GDP expansion on the order of 7 to 8 percent per year, supported by rates of capital

formation around 30 percent of GDP. Clearly, high growth and high investment shares have gone hand-in-hand.

However, the key role of investment in the growth process was challenged in the 1960s and 1970s by neoclassical growth theorists. In the neoclassical model (Solow, 1956), capital accumulation affects growth only during the transition to the steady state; by contrast, long-run growth is determined only by population growth and the rate of technical change, which was assumed exogenous. This view attracted considerable criticism from a number of authors (e.g., Kaldor 1957, Robinson 1962) on the grounds that the separation between investment and innovation (or technical change) was artificial, as most technical innovation tends to be embodied in new machinery and equipment.[9] Growth-accounting exercises based on the neoclassical model (Solow 1957; Denison 1962, 1967) appeared to confirm that cross-country differences in investment ratios could explain only a limited portion of the differences in per capita growth performance over long periods, suggesting a crucial role for technological change (or, more honestly, unidentified residual factors) as a major source of long-run growth.

The arithmetic of the Solow model, however, does not square well with the strong correlation between investment ratios and growth performance observed in practice (see Romer, 1987). Recent research addressing this issue has brought capital accumulation back to center stage of the growth process, suggesting an enhanced -- albeit more indirect -- role for investment as a key growth determinant. One line of research focuses on the complementarities between investment in physical and human capital: new and technologically advanced machines and equipment need to be operated by workers with adequate skills and education. Likewise, the identification and design of profitable and innovative investment projects requires also the existence of an entrepreneurial class with innovative skills and awareness of business opportunities. Along these lines, Mankiw, Romer and Weil (1992) extend the Solow model to

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[9] See also Schumpeter, 1934, who emphasized the fact that most innovations were embedded in the production of new capital goods and business practices.

include human capital and, under the assumption that its accumulation is guided by that of physical capital, find that investment performance can account directly and indirectly (i.e., through the parallel accumulation of human capital) for the bulk of the variation in growth performance across countries.

A second line of research, that has featured prominently in the "new" growth literature (e.g., Romer 1986, 1987, among many others) emphasizes the close links between the accumulation of physical capital and technological change (a point that had been underscored already by Allyn Young back in 1928, and also by Kaldor 1957 and Arrow 1962). If productivity growth is endogenous rather than exogenous, and related to the accumulation of physical (or human) capital, then an increase in the rate of investment again raises the rate of growth in the steady state.

The strong correlation between technical progress and investment (or the capital stock) has been amply documented. Baumol *et. al.* (1989), for example, show that in industrial countries technical change is highly correlated with capital/labor ratios. De Long and Summers (1993) estimate panel regressions of total factor productivity growth (TFP) for a large sample of developing countries. Consistently, their results show a positive and statistically significant correlation between the ratio of equipment investment to GDP and total factor productivity growth; they also find a negative coefficient for structures investment in the regressions.

If technical progress is driven by investment, then capital accumulation by any one firm benefits other firms in the economy, creating an externality that opens a gap between private and social returns to investment. In fact, De Long and Summers (1993) calculate a net social rate of return on equipment investment that is about 35 percent per year: 10 percent is the privately-appropriated return on capital and 20 percent corresponds to the external effects induced by the correlation between equipment investment and TFP growth. These figures, as the authors recognize, are probably on the high side but still provide an order of magnitude of the possible divergence between private and social returns to

investment. Earlier work by Romer (1987) likewise estimated that the social marginal product of capital could be over twice as high as the private marginal return.

From correlation to causality

The strong investment-growth correlation referred to above has been extensively corroborated by a number of econometric studies. Levine and Renelt (1992) conducted extensive tests on the robustness of alternative specifications of the growth process. In particular, they looked for the specification least sensitive to changes in additional explanatory variables, the sample of countries and the choice of time periods. Their main result is that the only robust regressor in the different growth equations -- both across countries and over time -- is the ratio of physical investment to GDP. Other variables, such as indices of external openness and price distortions, and indicators of fiscal and monetary policy stance, all are uitimately fragile as regressors. Moreover, this general result also holds in other empirical analyses of growth conducted for Latin America and East Asia.[10]

De Long and Summers (1991, 1993) have advanced one step further by disaggregating investment into its structures and equipment components. They present abundant empirical evidence, for both developing and developed economies, of a crucial nexus between investment in machinery and equipment and the rate of GDP growth. Estimating panel growth regressions for a sample of 88 non-oil exporting countries for the period 1960-85, DeLong and Summers found a much higher contribution of machinery and equipment investment than structures investment to GDP growth. The result also holds for sub-samples arranged according to different income levels and continents.

A related line of work is that of Easterly and Rebelo (1993), who explore the relationship with growth of different types of public investment. They gathered data on aggregate and sectoral public

[10] See De Gregorio (1992), Corbo and Rojas (1993), Lefort and Solimano (1993) for Latin America and Young (1994) for East Asia.

investment for nearly 100 countries. Subject to some reservations about the quality of their information, the authors find that central government investment is positively correlated with both growth and private investment, while investment by public enterprises (which presumably competes more closely with private investment projects) is negatively correlated with growth. Sectorally, they also find that the strongest growth impact corresponds to public investment in infrastructure (transport and communications). These findings agree well with analytical and empirical results reported by Serven and Solimano (1993) on the complementarity between public and private investment. Public investment in ports, roads, telecommunications and the like, provides the basic infrastructure needed for private investment projects to operate profitably; thus, such types of public projects are likely to have a maximum impact on growth. Empirical studies of private investment for Latin America (Serven and Solimano, Chapter 7) and East Asia (Chapter 8) show a positive and significant correlation between public and private investment.

While all these empirical results underscore potentially important aspects of the investment-growth link, in principle they say little about the direction of causation. And, like with saving, it is necessary to distinguish between the cycle and the long term. In the short run, investment has been empirically shown to depend on the rate of output growth and/or the rate of capacity utilization, as indicators of future demand pressure and/or the severity of liquidity constraints faced by firms -- two key variables in their decision to expand productive capacity. Thus, over the business cycle investment can be led by output in an accelerator-like fashion (see Serven and Solimano 1993, Chapter 2 for further discussion and references).[11]

In the long term, the traditional wisdom of development economics has long been that capital accumulation is a fundamental *cause* of the growth process. Recently, however, this view has been

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[11] It is worth noting that this sensitivity of investment to cyclical variations in output (or other short-term factors) opens the possibility that short-term recessions could have long-term effects, by causing a deep investment slump that leaves the economy permanently trapped in a low-growth, low-investment equilibrium. In other words, the growth process could be path-dependent. See Bruno (1994) for further discussion and some country experiences.

challenged by several authors (e.g., Benhabib and Jovanovic 1991, King and Levine 1994) who argue that the co-movement of investment ratios and growth rates may be largely due to the action of a third factor -- technological innovation – driving both capital accumulation and output expansion. An extreme interpretation of this view would hold that capital accumulation is just a *consequence*, rather than a cause, of the growth process. Along these lines, empirical evidence recently provided by Blomstrom, Lipsey and Zejan (1993) using a sample of 100 countries shows that growth Granger-causes investment, but not conversely.

Is investment sufficient for growth?

While the extreme view just described seems rather implausible, the lesson to be drawn is that the investment-growth relationship is more complex than suggested by the conventional wisdom. Indeed, the simplistic (albeit popular) view that capital accumulation is *the only* pre-requisite for economic growth – a notion labelled "capital fundamentalism" by Yotopoulos and Nugent (1976) – is untenable as well. As the recent literature has emphasized, other complementary inputs (notably, human capital and technical knowledge) are also paramount for growth.

But even if these other inputs are available, the *quality* (i.e., productivity) of investment is a key determinant of its ultimate reward in terms of growth. Brute-force capital accumulation in mindless pursuit of scale economies in a framework characterized by severe distortions is unlikely to have much of a growth payoff. Indeed, under extreme distortions massive capital accumulation can ultimately result in *reduced* growth when measured at shadow (i.e., distortion-free) prices. Examples of this situation are not difficult to find among countries with heavily regulated investment regimes and/or extensive barriers to market forces; an extreme case is that of the former Soviet Union (see Easterly and Fischer, 1994). Thus, an incentive framework free of major distortions can be instrumental to realize the full growth potential of capital accumulation.

However, the conclusion that investment may not be the sole engine of growth does not alter the fact that capital accumulation remains a *centerpiece* of that engine. In general, it is hard to find countries that have been able to grow at high and sustained rates for long time periods without an important effort of capital formation -- a fact noted long ago by economic historians such as Rostow (1958) or Gerschenkron (1962). In fact, one of the main merits of the recent literature lies perhaps in the renewed focus on technological change and external effects associated with physical investment as a major aspect of the growth engine -- filling what Romer (1993) labels the "idea gap", as opposed to the "object gap" that can be filled just by accumulation of material inputs. As noted earlier, this notion that technical progress is largely embodied in new capital goods is hardly new in growth theory. From this perspective, the recent literature's emphasis on the major role of productivity gains in long-term growth contributes to enhance, rather than lessen, the importance of capital accumulation for the growth process.

Nevertheless, it is important to note that the experience of East Asia over the last two decades suggests that the recent literature's emphasis on "ideas" may have been overstated: as Young (1993) has convincingly shown, East Asia's stellar growth performance can be fully explained by its unusually high investment ratios, and does not arise from any extraordinary productivity gains.[12] Indeed, Young estimates that over the last two decades productivity growth in East Asian countries proceeded at a rate close to the world average. This result is corroborated by DeLong and Summers (1993), in whose framework East Asia's rapid growth is likewise unsurprising given its rapid pace of investment in machinery and equipment.

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[12] It is important to recall, however, that East Asia's high rates of physical investment were also accompanied by an important effort at human capital formation.

4. SAVING

Regardless of whether saving is the chief force driving growth, ensuring adequate levels of saving remains a central policy concern in order to provide sufficient financing for investment and to avoid balance-of-payments disequilibria. Yet saving perhaps is the macroeconomic aggregate that is likely to be the most elusive to both the economist's understanding and the policymaker's influence. Whatever saving definition is used,[13] it shows massive dispersion throughout the world and over time. For instance, it is puzzling why two similar experiences of stabilization and reform in Latin America have implied such diverse saving response: in Chile gross domestic saving rates grew from 17.0% of GDP in 1974-87 to 27.0% in 1988-93, while in Mexico they declined from 26.3% of GDP in 1980-87 to 20.2% in 1988-92. For the U.S. many different explanations are offered for its secular reduction in net national saving rates from 8% in 1950-1979 to 4.5% in the 1980s and to less than 2% since 1990, including budget deficits, population ageing, and lower growth.

Having discussed the relations between saving and growth above, we focus next on three unresolved questions on the behavior of saving that are important for both research and policy design in developing countries.[14] They refer to the influence of public saving on national saving, the influence of foreign resource inflows on domestic saving, and the effectiveness of financial and tax incentives in raising private saving.[15]

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[13] Empirical work on saving is haunted by the low quality of saving data and the inadequacy of saving definitions. Aggregate saving data are often reported in national accounts statistics as a residual of another residual: consumption. Saving flows are typically inconsistent with changes in wealth stocks because of incomplete accounting, under-reporting of capital income, and exclusion of capital gains. Saving does not have any identifiable deflator related to it, hence making it difficult to construct constant-price time series. Finally, researchers often fail to adequately correct raw saving data, for instance, for the inflation component of nominal interest payments.

[14] Some of these unresolved puzzles have been pointed out by recent surveys of saving behavior in developing countries, see Gersovitz 1988, Deaton 1989b, and Schmidt-Hebbel, Webb and Corsetti 1992.

[15] Issues related to the sectoral disaggregation of saving and differences in sectoral behavior are considered explicitly by the first and second questions. We will not discuss, however, a further disaggregation of private saving among households and firms, although some evidence exists that households are not able to "see through the corporate veil" (for instance, Bosworth 1993 estimates that out of 9 OECD countries, the household saving offset

4.1 - How Effective is Fiscal Policy in Raising National Saving?

At a theoretical level, the two dominant paradigms in modern neoclassical macroeconomics offer two strikingly opposing views on this issue.[16] According to the life-cycle overlapping-generations model, public saving affects national saving (and hence capital formation in a closed economy) because it shifts resources across generations that are only weakly (or not at all) connected to each other. In contrast, the infinite-horizon (or Ramsey) model predicts that when private consumers internalize the government's intertemporal budget constraint, changes in public saving are exactly offset by changes in private saving because of strong intergenerational linkages (the well-known Ricardian equivalence, Barro 1974).

What does the evidence show? Most surveys of the empirical evidence for OECD countries reject Ricardian equivalence (Bernheim 1987, Hayashi 1985, Hubbard and Judd 1986, Leiderman and Blejer 1988); the notable exception is Seater 1993 who concludes that Ricardian equivalence holds approximately. Recent studies for developing countries also reject the Ricardian notion in its pure form (Haque and Montiel 1989, Corbo and Schmidt-Hebbel 1991, Easterly, Rodríguez and Schmidt-Hebbel 1994), but conclude that some offsetting of public saving by private savers occurs. Empirical rejection of Ricardian equivalence could imply that real-world consumption is bound by many features assumed away by Ricardian equivalence: weak intergenerational links, financial-market imperfections (including borrowing constraints), consumer myopia, and precautionary saving under uncertainty.

However, the existing estimates of offset coefficients are few, too different from each other, and belong to widely differing samples. Even when using a common methodology, country estimates vary widely. For example, Corbo and Schmidt-Hebbel (1991) develop a nested-hypothesis framework that

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coefficient for corporate saving is (not) significantly different from 1 in 6 (3) countries). However, there are very few saving studies for LDCs using household data, and only one using aggregate (national accounts) data for households (Schmidt-Hebbel, Webb and Corsetti 1992).

[16] See for instance Azariadis (1993), Blanchard and Fischer (1990), and Deaton (1992).

distinguishes between Keynesian, permanent-income and Ricardian consumption hypotheses and apply it to a panel data sample of 13 developing countries, rejecting each of these three simple hypotheses in their pure forms. In the overall sample, they find a public-private saving offset coefficient of 0.47; this result, however, conceals a large variation in individual-country offset coefficients. The same is true for Bosworth's (1993) results for a panel of 12 OECD countries, with average offset coefficients in the 0.24-0.33 range (depending on the saving definition), but with a much wider range of offset coefficients among countries. Japelli and Pagano (1994) report offset coefficients for a panel of OECD countries that vary between 0.38 and 0.48, and Edwards (1994) reports offset coefficients for a sample of OECD and LDC countries that vary similarly -- between 0.43 and 0.58 -- depending on the regression specification.

The implication of the frequent rejection of Ricardian equivalence is that public saving is an effective tool in raising national saving, at least in the short to medium term. However, just how effective fiscal policy is, is likely to be much disputed until more refined measures of offset coefficients are obtained.

4.2 - Do Foreign Resource Inflows crowd out Domestic Saving?

While in the above discussion on public and private saving decisions causality runs from the former to the latter variable, foreign and national saving decisions can affect each other in either direction. As noted in section 3.2, the higher is international capital mobility, the larger is the degree of endogeneity of foreign saving to domestic investment and saving decisions. What does the empirical literature say about the influence of foreign resource inflows on domestic saving (and investment)? We will start by referring to studies looking at the consequences of overall foreign saving, to summarize subsequently some results on the effects of foreign aid.[17]

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[17] Two analytically essential (but seldom acknowledged) points should be addressed by empirical studies. First, a distinction should be made between non-concessional foreign resource inflows (foreign investment plus non-concessional lending) and foreign aid (unilateral transfers plus the grant component of concessional lending). While

With a non-econometric analysis, Chenery and Strout (1966) found a negative initial effect of capital inflows on domestic saving, although second-round effects on capacity growth tend to increase saving. Giovannini (1983) finds coefficients on foreign saving for LDCs to have mixed signs and to be insignificant in domestic saving regression equations. Fry (1978, 1980) and Giovannini (1985) find the effect significant and negative, although small. Schmidt-Hebbel et al. (1992) show a significant negative effect of foreign saving on household saving for a panel sample of 10 developing countries. Gupta (1987) obtains the most extreme results: he reports crowding-in (instead of out), as reflected by *positive* coefficients on foreign saving, which are significant for Asia and Latin America but not for Asia.

Studies on the effects of foreign aid focus typically on how it is spent on consumption and investment, i.e., on empirical estimates of the marginal propensities to consume (MPC) and invest (MPI) of foreign aid transfers. The cross-country literature on the relation between foreign aid and saving (and investment) was started by Griffin (1970, 1971), who found from OLS regressions for a cross-section sample of LDCs a negative correlation between saving and aid, with an implied MPC of aid equal to 0.73. Subsequent studies by Weisskopf (1972), Papanek (1972, 1973), Chenery and Eckstein (1970), Chenery and Syrquin (1975) generally found far lower consumption propensities, implying that foreign aid was more effective in financing investment. However, much of this literature -- like that on the domestic saving effects of foreign resource inflows -- is haunted by severe biases stemming from data measurement error, mis-specification, and simultaneity (including selectivity) bias as well as an inadequate

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the former embody an external financing source, the latter implies a wealth transfer. Second, it is important to deal explicitly with resource fungibility at three different levels: external, domestic macroeconomic, and domestic microeconomic. External resource fungibility refers to the degree of international capital mobility. Perfect capital mobility is equal to extreme external resource fungibility and implies complete endogeneity of foreign resource inflows. Domestic macroeconomic resource fungibility implies that external resources lead to higher spending -- in the absence of external resource fungibility -- on both consumption and investment according to a domestic rationing mechanism (for instance interest rates) that is independent of the programmed resource use. Finally, domestic microeconomic resource fungibility implies that external resources lead to higher spending -- in the absence of both external and domestic macroeconomic resource fungibility -- on the broad spending category they are intended for (for instance on consumption if intended for food consumption), but not necessarily on the specific project or sector they are targeted to.

treatment of resource fungibility (see Papanek 1972, Levy 1987, White 1994, and Boone 1994 for methodological discussions).

More recently, Levy (1988) found a MPC from anticipated foreign transfers equal to 0.4. For a sample of Sub-Saharan countries, the Global Coalition for Africa (1993) claims a negative and significant effect of foreign aid on domestic saving. The World Bank reports a MPC of 0.4 and a MPI of 0.6 for net transfers received by Sub-Saharan countries in the late 1980s (World Bank, 1993b). The most systematic study available to date (Boone 1994) comes to the opposite conclusion, drawn from panel estimations for 97 developing countries. When the sample is restricted to the 82 countries where aid is less than 15% of GNP -- that is, most LDCs -- all of aid is spent on consumption while nothing goes to investment.[18] However, when the full sample is used (including the 15 small SSA and island economies that receive aid equal to more than 15% of their GNP), Boone's estimated full-sample MPC drops to 0.45 and his MPI increases from zero to 0.35, suggesting that the lack of resource fungibility is severe in small and poor countries receiving massive aid financing primarily investment projects. His overall finding of a very high MPC in most other countries is consistent with his model that postulates a world comprised of heterogeneous countries that do not converge in income levels. In such a model the MPC of foreign aid is 1.0 -- but no convergence in income levels seems to be a rather stringent assumption.[19]

We draw three conclusions. First, empirical estimates of saving effects of foreign aid (and foreign saving at large) vary widely with samples, model specifications, and empirical methods. Second, the extent of external and domestic resource fungibility is the key determinant of the extent to which non-

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[18] Boone (1994) reports that 93% of foreign aid is grants and that the portion of tied aid is quite small. Emergency and food aid represent only 5% and 13% of foreign aid, respectively; over 40% is general balance of payments support.

[19] Foreign aid could affect saving and investment indirectly. For instance, private investment and growth could rise when foreign aid conditionality is successful in promoting policy reforms and a better allocation of public expenditure, raising the productivity of private investment. However, Boone's cross-country growth regressions show that foreign aid does not play a positive role in most (82) developing economies -- but aid helps growth in those 15 small LDCs where it exceeds 15% of GNP.

concessional external resource inflows and foreign aid are channeled to higher domestic consumption and investment. Finally, and most important, very little is known about how to measure resource fungibility and how to identify its underlying causes. Until the latter issue is resolved, the relation between foreign resource inflows and domestic saving will be blurred.

4.3 - Do Financial and Tax Incentives raise Private Saving?

Governments have attempted to raise private saving through many means, including interest liberalization, direct tax incentives, and capital market reforms. Many of such attempts have failed, however (Gersovitz 1988, Deaton 1989b), and this raises questions about the responsiveness of saving to such policies.

Is Private Saving Sensitive to the Real Interest Rate and to Tax Incentives?

There are two ways of looking at this question. One is by testing for the interest effect on saving or consumption levels. Along this traditional line of research, country and cross-country studies for OECD countries tend to show that saving is not much influenced by interest rates (see Deaton 1992, section 2.2). Increasing evidence for developing countries (Giovannini 1983, 1985; Corbo and Schmidt-Hebbel 1991; Schmidt-Hebbel, Webb and Corsetti 1992) suggests that private saving (or consumption) typically does not respond to the real interest rate. Edwards (1994) confirms the insensitivity of private saving to the real interest rate for a cross-country sample of OECD and developing economies. In those exceptional cases where a positive response of saving to the interest rate is found (Gupta 1987, Fry 1988), it is quantitatively very small. There are many possible reasons for this finding.[20] For

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[20] One possibility is that the findings might be spurious due to severe aggregation problems assumed away by the representative-agent model. Following Deaton (1992, pp. 70), consider a two-overlapping-generations life-cycle model without bequests, where consumption at the individual level of each generation is flat along the life horizon, but where life-time consumption of each generation is increased by productivity growth. Then aggregate consumption will increase over time implying a biased estimate of the intertemporal elasticity of substitution of the

consumers not facing liquidity constraints, the substitution, income and human wealth effects of an interest rate rise roughly neutralize each other when the intertemporal elasticity of consumption substitution is close to 1, as has been found by Schmidt-Hebbel (1987) and Arrau (1989) for Southern Cone countries. Second, liquidity-constrained individuals do not respond much to changes in saving incentives -- and liquidity constraints have a significant and positive effect on private and national saving rates in both OECD and developing countries (see Jappelli and Pagano 1994 for the former and Easterly, Rodríguez and Schmidt-Hebbel 1994 for the latter). In addition, there could be a non-monotonic relation between saving and interest rates arising from income concentration when interest rates increase. This would imply that at low and negative real interest rates, higher rates raise saving while at high interest rates the saving schedule bends backwards. Evidence for this has been provided by Reynoso (1988) for some developing countries.

A less conventional way of looking at this issue is by testing how sensitive the rate of consumption growth is to the interest rate, following the Euler equation approach. This is equivalent to testing separately for the intertemporal substitution effect. Evidence reported by Deaton (1989b) suggests a weak positive substitution effect across a large number of countries. Surprisingly, econometric studies for the U.S. fail to find significant positive effects. For developing countries Giovannini (1985) finds positive substitution effects for 5 countries and no effects in 13 countries.

If on average private saving were insensitive to the (after-tax) real interest rate, three policy implications would follow. Fiscal stabilization, if it lowers the real interest rate, would not depress private saving through this channel. Financial reform, if it raises the real interest rate, would not raise the flow of private saving through this channel, although it may affect significantly the portfolio composition of the stock of savings, possibly from flight capital to domestically-held financial assets. And tax incentives for saving would be ineffective in raising private saving.

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presumed representative agent as obtained from the macro data.

On the latter point a sizable literature has focused on the saving effectiveness of tax incentives in OECD countries, particularly in the U.S., making use of cross-section household data typically unavailable in LDCs. The results of the studies for U.S. saving incentive plans (such as IRAS, 401(k) plans and other schemes that offer tax deductions on contributions and accrual of interest but impose limits on annual contributions and withdrawals) are still inconclusive on their effects on overall national saving (see Gersovitz 1988, Deaton 1989a for surveys). Among the more recent studies, Engen, Gale and Scholz (1994) find that U.S. saving incentive plans have been ineffective in raising national saving although they may raise saving after two generations as a result of income shifts toward future generations.

Could Financial and Capital-Market Reforms raise Private Saving?

Financial and capital-market reforms have potential effects on private saving -- other than through changes in real interest rates -- through various channels whose effects are of different signs. First, capital-market reforms (and macroeconomic stabilization) could lead to reverse capital flight, raising the portfolio share of domestic assets and increasing measured income, measured net exports, and measured domestic saving, but without affecting overall (correctly measured) private saving very much. Second, financial liberalization and capital-market deepening could raise the efficiency of intermediation, increasing growth and hence (indirectly) private saving (Easterly 1993, King and Levine 1993). Third, financial liberalization -- and the consequent increase in geographical density of financial institutions, range of financial instruments, and quality of financial-sector regulation and solvency-enhancing supervision -- typically leads to financial deepening, reflected in a permanent increase in the stocks (and a temporary increase in the flows) of financial savings, such as financial and banking-sector liabilities. Still, this increase in financial savings could simply reflect a portfolio shift without affecting overall private saving. Fourth, financial liberalization typically leads to expanded consumer lending and, more

generally, less stringent constraints on consumer borrowing, affecting private saving negatively. It has been argued that, on balance, financial deepening has contributed to the growth in overall saving observed in East Asian economies (World Bank 1993a).

Empirical studies have typically proxied financial deepening by a measure of broad money (e.g., M2); but broad money could be negatively correlated with consumer borrowing constraints (and hence positively with consumption), and positively correlated with consumer wealth (and again with consumption as well). Hence its effect on saving is ambiguous -- and so are the empirical results for cross-country samples. For instance, while Corbo and Schmidt-Hebbel (1991) and Schmidt-Hebbel, Webb, and Corsetti (1992) report negative effects of broad money on saving in LDCs, Edwards (1994) reports positive effects for OECD and developing economies.

Variables that reflect borrowing constraints more closely are reported to have less ambiguous effects on saving in empirical cross-country saving studies. Jappelli and Pagano (1994) found a significant negative effect of loan-to-asset-value ratios on net national saving in OECD countries and Edwards (1994) found a negative but insignificant effect of consumer credit on private saving in OECD and developing countries.

A final question arises about the potential effects on private and national saving of one important reform with significant capital-market labor-market and public-saving implications: the introduction of mandatory pension schemes and pension reforms that substitute pay-as-you-go (PAYG) systems by fully-funded (FF) schemes. While the overall evidence on mandatory pension systems is ambiguous for the U.S. and Japan, there is some evidence that Singapore's Central Provident Fund boosted aggregate saving (World Bank, 1993a) and that government expenditure on social security benefits (typically through state-run PAYG schemes) has reduced private saving (Edwards 1994). Pension reforms that substitute FF for PAYG systems could have long-term static effects on saving and the level of output and dynamic effects via capital-market deepening and higher growth. Simulation results for the U.S. (Auerbach and Kotlikoff

1987) and for representative LDCs (Arrau and Schmidt-Hebbel 1993, Valdés-Prieto and Cifuentes 1993) suggest that the long-term static effects are small. However, dynamic effects through capital-market deepening and growth could be significant, as suggested both by simulations based on a endogenous-growth model as well as by regression results that explain the spectacular increase in private saving rates attained by Chile after financial market and pension reforms were adopted (Corsetti and Schmidt-Hebbel 1994).

5. INVESTMENT: NEW DEVELOPMENTS

As noted above, the analysis of investment decisions was pioneered by Keynes (1936), who challenged the then-prevalent view of the inseparability between saving and investment decisions. He emphasized the distinction between investors and savers, and viewed investment as a decision made under highly uncertain conditions that required unavoidable guesses about prospective future returns and capital costs.

Since the 1960s investment theory has been in rapid evolution.[21] We begin this section by reviewing some recent developments in investment analysis. We focus on three issues: the implications of irreversibility and uncertainty for investment, the links between economic and political instability and investment, and the private investment consequences of ill-defined property rights and phenomena such as corruption.

5.1 Uncertainty and Irreversibility

Conventional investment theory focused on different variants of the cost of capital (Jorgenson) and the replacement-versus-market-value of new capital goods (Tobin) as centerpieces of investment decisions. These theories provided useful insights about the decision to invest but failed to fully consider

[21] See Serven and Solimano (1993, Chapter 2) for a survey of investment theories.

three main features of investment decisions:[22] (i) the partial or complete *irreversibility* of most investment decisions -- once the capital stock is installed it cannot be put to a new use without incurring a substantial economic cost; (ii) most investment decisions face inherent *uncertainty* regarding future benefits and costs -- the best investors can do is to attach (subjective) probabilities to the net returns of different investment projects; finally, (iii) investors can control the *timing* of investment, waiting for relevant information that can reduce the uncertainty surrounding investment.

These crucial features have led to a new *option approach* that sees an investment opportunity as an option to buy an asset at different points in time, balancing the value of waiting with the opportunity cost (in terms of foregone returns) of postponing investment decisions.[23] Some empirical studies of investment both at microeconomic and aggregate levels confirm the importance of the value of waiting.[24]

5.2 - Economic and Political Crises and Investment

Economic and political instability is an important field of application of the option view of investment. In particular, political and economic *crises* (a large external shock, a financial crash, a war, exacerbated social and political conflict) typically create considerable uncertainty about variables which are key in the decision to invest. The result can be a huge increase in the value of waiting for new information in order to revise the probabilities attached to the various possible events; this is turn causes an investment slump.

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[22] See Dixit and Pindyck, 1994, chapter 1.

[23] The option approach shows that the standard net present discounted value rule of investment (invest when the purchase and installation cost equals the expected return) must be modified. The correct rule is that the value of the new capital good must *exceed* the purchase and installation cost, by an amount equal to the value of keeping the investment option alive.

[24] See particularly chapter 4 in Serven and Solimano (1993).

Political instability reflected in rapid government turnover may also hamper investment, if it leads to an unstable incentive and policy framework. An adverse investment impact is especially likely when the political change involves a re-definition of the basic "rules of the game" (investment codes, property rights, tax laws) and, in particular, when it raises expropriation risks (e.g., Chile in the early 1970s, Nicaragua in the 1980s). Empirically, recent studies (e.g., Alesina and Perotti 1993, Mauro 1993) confirm the important role of political instability as an investment deterrent.

5.3 - Property Rights and the Cost of Doing Business

There is no question about the importance of property rights for investment. From the practical viewpoint, however, the formal definition of property rights needs to be complemented by other factors guaranteeing their effective enforcement. An important link in that enforcement are principal-agent relationships, that tend to be very complex. Monitoring of agents (managers, workers) by the principal (the owner) often has to face imperfect information and is costly. The mere existence of private property is no assurance that the agents will act in the best interests of the owners, a feature that is particularly relevant for investment.

Related to this is the issue of contract enforcement, whose effectiveness can be jeopardized by weak and inefficient judiciary systems. Yet without proper contract enforcement, property rights would be good only on paper. In the end, the lack of impartial mechanisms to resolve contractual disputes results in an increased cost of doing business, as the probability that contracts will be respected diminishes and/or expenses such as bribes become necessary.

This leads to the issue of corruption, which is critical for investment projects because their implementation -- particularly in highly regulated economies -- may involve many administrative steps: getting an investment permit, obtaining licenses to import critical inputs, gaining access to directed credit, assuring compliance with labor standards and environmental regulations, etc. The cost of doing business

can rise substantially if the typical investor is forced to bribe government officials in order to complete or speed up these administrative steps. In this regard, corruption effectively amounts to a tax on investment. Recent cross-country empirical work by Knack and Keefer (1994) shows that higher measures of corruption, just like weaker property rights, tend to be associated with a significantly worsened investment performance.

The elimination of unnecessary regulation can reduce potential sources of rents for bureaucrats and thus corruption. Civil service reform, including competitive-pay policies, career opportunities and moral standards is also an important aspect of institutional reform to boost investment and growth.

5.4 - Profits, Income Distribution and Capacity Utilization

A basic insight of Keynes (1936) is the dependence of investment on expected profits (relative to the cost of capital). The rate of profit (profits over capital), can be expressed as the product of the profit *share* (profits over output) times the rate of capacity utilization (output over capital). This brings out two key determinants of investment: income distribution and the level of aggregate demand (or phase of the business cycle). Income distribution essentially refers to the shares of capital, labor and other factors in national income. However, the relationship between income distribution and capital accumulation is a complex one. On the one hand, a distribution of income biased towards capital can increase the profit rate through a higher profit share. On the other hand, if aggregate demand depends negatively on the profit share -- due to a higher propensity to spend for labor than capital -- then a redistribution of income towards capital will depress aggregate demand, lower the rate of capacity utilization and depress the profit rate. In sum, the *profitability effect* can operate in an opposite direction to the *demand effect*, making the relationship between income distribution and investment ambiguous.

Other channels might be relevant too for the relationship between accumulation and distribution. Income distribution affects the choice of public policies and the degree of social and political stability:

an uneven income distribution may encourage workers' demands and labor militancy, increasing the degree of political conflict. An uneven income distribution might also compel governments to seek populist policies of rapid redistribution of income that can be fiscally and macroeconomically destabilizing, as has been witnessed several times in Latin America during the last few decades (see Dornbusch and Edwards, 1991). Redistributive policies in turn, may be financed through higher taxes on capital thereby discouraging investment and growth. The relationship between investment and distribution is filtered by political institutions, and can be stronger in democracies than in non-democracies (see Persson and Tabellini, 1992 and Alesina and Rodrik, 1992). Empirical evidence for a cross-section of countries provided in Persson and Tabellini (1992) shows a positive and marginally significant correlation between equality in income distribution and the investment-to-GDP ratio.

Stronger results are obtained in Alesina and Rodrik (1992). In cross-section regressions using the ratio of total physical investment over GDP as the dependent variable and controlling for the type of political regime (democracies versus non-democracies), they find a positive correlation between the degree of income equality and the investment ratio. A similar result arises when using average GDP growth rates as the dependent variable, thus suggesting that investment is an important channel through which income distribution affects GDP growth.

6. ADJUSTMENT, REFORM, SAVING AND INVESTMENT

This section discusses the main linkages between investment, adjustment and overall systemic reform. Many adjustment programs seek to correct an excess of aggregate spending over real output that creates a deficit in the current account of the balance of payments and/or inflationary pressures. From simple national accounts identities the aggregate excess spending signifies an excess of investment over saving. A cut in investment spending often takes place during the first phase of an adjustment program (see below). This is an adverse trend if the investment compression lasts too long, as was the case of

Latin America in the 1980s after the debt crisis. In this case, productive capacities are impaired and so is the economy's ability to grow. However, if the productivity of investment is low then some decline in investment will not be that harmful.

National saving also tends to follow a distinct pattern according to the different phases of an adjustment and reform program (of varying length, overlap and partial recurrence). To understand the interactions between investment, saving, adjustment and reform it is useful to separate between the pre- and post-reform situations.

6.1 - The Pre-reform Situation

There is a wide variety in initial conditions for reform. Some countries might experience instability and large macro imbalances such as high and erratic inflation, exchange rate volatility, fiscal deficits and balance of payments disequilibria. Examples abound, including Argentina, Brazil, Peru, Poland, Russia in the late 1980s and the early 1990s. In contrast, other countries have initiated their reform programs from more stable macro conditions,[25] but with pervasive microeconomic distortions and an oversized state.[26]

When instability is rampant before reform, private investment is hurt. The key reason is that, as noted earlier, instability and uncertainty invite a delay in investment spending as most investment outlays are irreversible. Empirically, evidence for five high inflation countries in Latin America from 1960 to 1990 shows that private investment is negatively correlated with the level (and sometimes the variance) of inflation and with the variance of the real exchange rate, two indicators of macroeconomic instability. Interestingly, when the same equations for private investment are run for (low inflation)

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[25] In these economies, the macro disequilibria (e.g., inflation) can be repressed. In turn, fiscal and balance of payments deficits can be financed by external aid granted for some specific geopolitical reasons.

[26] See Solimano, Sunkel and Blejer (1994, Chapter 1) for a discussion of initial conditions before reform in a broad variety of countries.

OECD economies, investment is negatively correlated also with inflation and measures of exchange rate volatility (see Pindyck and Solimano, 1993).[27] These results clearly support the hypothesis that instability is a powerful deterrent of private investment.

Pre-reform instability can also affect public investment, in particular if there is a fiscal crisis that forces governments to cut spending. In general, capital expenditures are cut before current expenditures, as the latter cuts often create less political resistance. Of course the costs show up in the future through lack of infrastructure and other productive capacities.

In the case of highly distorted but more "stable" macroeconomics, the problem is the low productivity of investment rather than too low a level of capital accumulation. The problem becomes one of "quality" rather than "quantity" of investment.

6.2 - The Reform Period

Let us turn now to the situation in which reform policies are adopted. For analytical purposes we will identify three different phases of reform programs that are relevant in terms of their impact on investment and saving.

Phase I. Adjustment and Stabilization

In economies with large macro disequilibria, the first task of a reforming government is to restore basic macro balances and stabilize inflation. The typical package involves a combination of expenditure-reducing policies (fiscal and monetary restraint) along with expenditure-switching policies (depreciation of the real exchange rate). These policies are usually supplemented by the elimination of various subsidies and by foreign financing coming from multilateral institutions.

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[27] The relationship between investment and inflation is found to be non linear in Pindyck and Solimano (1993). Only when inflation rates exceed certain thresholds a significant drop in investment takes place; moreover, these thresholds are much higher in Latin America than in the OECD.

Austerity measures tend to reduce capital formation, at least in the short run, for several reasons. Fiscal adjustment often involves a cut of public investment, currency depreciation makes imported capital goods more expensive and monetary tightening pushes up real interest rates depressing private capital formation.[28]

On the saving side, during this first stage fiscal adjustment is also reflected in higher public saving. However, the contractionary effects of restrictive aggregate demand policies typically lead to a steep decline of private saving, as consumers attempt -- as long as they are not credit-constrained -- to maintain their consumption levels during the recessionary phase. National saving often falls during this stage -- a result of private saving cuts that exceed the increases in public saving. Depending on how strong the decline of domestic investment is, the ex-ante demand for foreign saving -- satisfied ex-post only in the absence of a foreign borrowing constraint -- could rise or fall during this period.

Phase II. Intensification of structural reforms and the Investment Pause

A second phase in reform programs comes after the basic macroeconomic disequilibria have been corrected. At this stage governments can accelerate the structural reforms comprising restructuring and liberalization. Of course, in practice there might be some simultaneity between macro stabilization and the structural reforms as the latter will hardly consolidate if the macro fundamentals are not in place.

The response of investment in this second phases is mixed. In Chile private investment responded forcefully to the launching of reforms in the second half of the 1970s.[29] Likewise, private investment has surged in Argentina and Peru in the early 1990s after the launching of liberalization policies. By contrast, the response of private investment was modest in Israel, Mexico and Bolivia, in the aftermath

[28] See Serven and Solimano (1993, Chapter 2) for a survey of the effects of fiscal, monetary and exchange rate policies on investment.

[29] This response was reversed in the crisis of 1982-83.

of stabilization during the second half of the 1980s. A substantial deal of work has been done on the so-called "investment pause" after adjustment.[30] The combination of lack of confidence in the consolidation of structural reforms and the fact that investment is irreversible (in an economic sense) makes investors adopt a "wait and see" attitude in the aftermath of stabilization.

Public investment often suffers during the adoption of reform policies. In part this is a byproduct of fiscal adjustment; however, the decline in public investment also obeys a deeper structural change. In the new development strategy that follows the adoption of market-oriented reform, a smaller role for the state is envisaged both as producer and provider of basic infrastructure. The privatization of state-owned enterprises typically leads to a decline in public investment. Also, the opening of new business opportunities to the private sector in activities that were formerly in the realm of the public sector -- like power generation, roads, ports -- leads to a decline in public investment in these activities. How does private saving respond to these structural reforms? If certain reforms -- such as trade opening or liberalization of capital inflows -- are not fully credible, they may spur a consumption boom to take advantage of temporarily cheap imported goods. And if they are credible and lead to an expectation of higher permanent income, consumers may spend today in anticipation of tomorrow's income gains. Moreover, trade liberalization frequently allows consumers to adjust their holdings of consumer durables toward desired levels after years of import deprivation. For all these reasons liberalization policies lead often to an initial decline in private saving that can be offset by an increase in public saving as fiscal adjustment is deepened in this phase.

Phase III. Maturity of Reforms and High Growth

The third phase of a reform program reflects consolidation of the measures taken before. This is a "happy period" as the fruits of reform start to accrue in terms of higher growth, enhanced stability

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[30] See Dornbusch (1991b), Solimano (1992, 1993), Serven and Solimano (1993).

and improvement in living standards. Examples of countries in this stage would be Chile in the late 1980s and early 1990s and the rapidly-growing economies of East Asia. At this stage the main problem is not how to get investment and growth underway, but rather how to preserve the dynamism already achieved. In this case, the sensible thing would be to maintain the "fundamentals" in place -- low inflation, fiscal balance, external sustainability, adequate price signals, social stability -- and monitor the sectoral composition of investment. In fact, during more advanced stages of the development process it becomes crucial to enhance the economy's infrastructure and support the physical investment effort with the provision of better education, training and other forms of human capital accumulation.

On the saving side, once durable stock adjustment is well-advanced and real growth is rising, private consumption tends to grow less than income, therefore generating a steady rise in private saving, as exemplified by the increase in Korean urban household saving rates from 3% of household income in 1965-1970 to 23% in 1980-85 (Collins 1991) and by the rise in the private saving rate in Chile from 1.0% of GDP in 1979-81 to 12% in 1982-89 and to 17% in 1990-92 (Corsetti and Schmidt-Hebbel, 1994).

7. POLICY ISSUES AND FINAL REMARKS

We conclude by summarizing our discussion of the saving-investment-growth mechanism and deriving some policy implications for saving and investment.

Three general lessons can be drawn from the recent theoretical and empirical literature. The first one is that, in spite of the virtuous circles of high saving and investment and rapid growth apparent in the empirical facts, the saving-investment-growth relationship is a complex one, in which causality runs in several directions. The second lesson is that, nevertheless, saving seems to be mostly passive and in many instances it appears to follow -- rather than precede -- investment and growth, contrary to the Mill-Marshall-Solow tradition. Finally, the third lesson is that investment and innovation remain the

centerpieces of the growth process. In this regard, the new growth literature represents a decided (albeit perhaps unintended) return to the tradition initiated by Marx, Schumpeter and Keynes.

Saving

Even if saving is not the chief driving force behind growth, ensuring adequate saving levels still remains a central policy concern in order to guarantee sufficient financing for capital accumulation and avoid an excess of investment over saving that can create inflationary pressures and/or balance-of-payments disequilibria. Moreover, encouraging private saving may be essential to expand investment in a framework of extensive capital market imperfections and liquidity constraints on firms and households, typical of many developing economies.

From our discussion of saving determinants, we derive three policy conclusions. First, since the evidence shows that public saving does not crowd out private saving one-to-one, raising public saving is an effective, direct way, available to policy makers in order to raise *national* saving.

Second, as long as the domestic macroeconomic policy framework is sustainable, the domestic banking sector is effectively regulated and supervised, and the government does not provide guarantees on foreign credit flows, foreign saving inflows should be allowed and encouraged to support domestic investment -- even if they help in part to finance consumption.

Third, the empirical evidence indicates that one should not expect higher private saving in response to interest rate liberalization. Market-determined interest rates will improve financial intermediation, the quality of portfolio choices (hence avoiding or reverting capital flight and, possibly, raising measured saving flows) and the quality of investment, but not necessarily the total volume of saving. Financial deepening (as reflected by higher financial savings stocks) has ambiguous effects on saving while a relaxation of constraints on consumer lending tends to depress private saving. By contrast, pension reform can be much more important in mobilizing domestic resources.

Investment

If investment and innovation are the key to growth, an important policy question is whether an activist "investment policy" is needed to boost growth and, if so, which form it should take. In theory, the need for an activist policy could be justified by the existence of investment externalities, as implied by the positive correlation between investment and total factor productivity growth. To correct the externality, the conventional policy response would involve subsidies and/or tax exemptions to capital accumulation. However, although this type of direct-intervention policy might theoretically boost growth, there are, in practice, serious limitations to the administrative and institutional capacities of government agencies to target the "right" investments and avoid rent-seeking.

A perhaps more effective way to promote investment, innovation and growth is through the provision of a supportive policy and institutional framework. Such a framework requires several ingredients: macroeconomic stability, a relatively distortion-free relative price structure, well-defined (and effectively enforced) property rights, an environment conducive to a low cost of doing business, and adequate political institutions that foster social consensus and political stability. To complement all this, the government should ensure the provision of adequate infrastructure and human capital investment -- be it in the form of public projects or with private sector participation.

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